Non-Lubricated Diamond-Coated Bearings Reinforced by Carbon Fibers to Work in Lunar Dust, Phase I

Completed Technology Project (2007 - 2007)

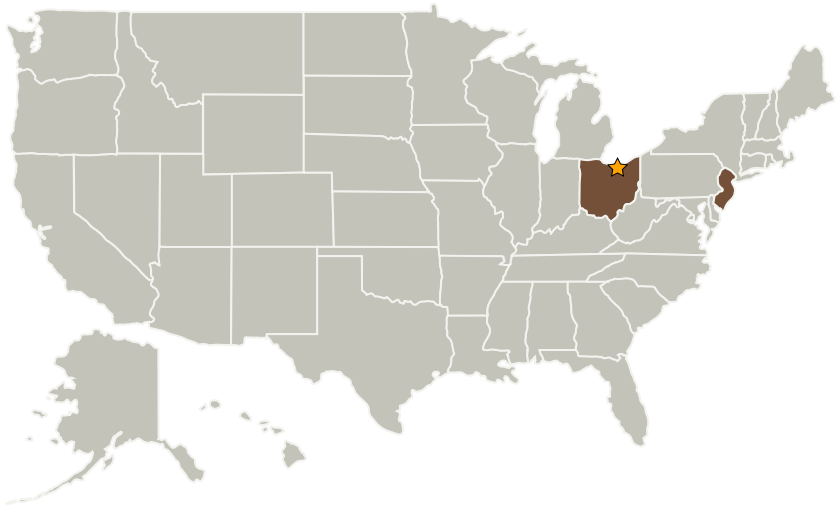
Project Introduction

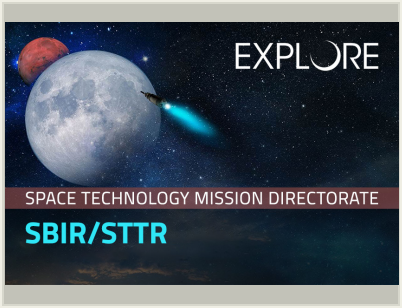
We propose to develop low cost diamond composite bearings utilizing our new high pressure technology for carbon fiber reinforced 3-D C/C composites and mixtures of pitch, fullerenes and nanotubes. Functionally graded bearings will be engineered to function without lubrication and to operate in Lunar dust. Tests have shown that these new materials are thermally and chemically stable, have a very high wear resistance on the diamond coated surface and can work in sand and regolith like unlubricated sliding fits. Such bearings are also extremely lightweight. Our variety of diamond coated composite would be easily scalable and cost effective to fabricate. In Phase I, we will focus on designing and prototyping precision unlubricated bearings. For Phase II and III, we will work in collaboration with leading companies that produce ceramic bearings.

Anticipated Benefits

Non NASA applications: The bearings that we plan to develop could be utilized for high speed applications at low temperature and high temperature ranges. They are corrosion and wear resistant and can work in aircraft engines, rock drilling and other abrasive environments. NASA applications: Potential applications of this material are bearings for Lunar regolith excavators and other planetary missions.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Diamond Materials, Inc.	Supporting Organization	Industry Small Disadvantaged Business (SDB)	East Stroudsburg, Pennsylvania

Primary U.S. Work Locations	
New Jersey	Ohio

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Kenneth W Street

Principal Investigator:

Oleg Voronov

Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.1 In-Situ Resource Utilization
    - TX07.1.2 Resource Acquisition, Isolation, and Preparation